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UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Agricultural Economics✓ LIFE OF FARM TRACTORS 1/ X

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This report contains an estimate of the life of wheel tractors, and the annual use and distribution by size of farm of wheel tractors that are more than 20 years old. The life estimates apply to factory-produced wheel tractors bought before January 1, 1948. Thus the findings cannot be interpreted as necessarily applying to tractors now being produced.

The factory-made wheel tractor is the predominant tractor on farms in this country. Of the 3,150,000 tractors estimated on January 1, 1948, almost 90 percent were of this type. The estimate of tractor life as given in this report is confined to wheel tractors because they are the only type for which annual purchases can be closely approximated, or for which the number on farms by year of make can be closely estimated by sampling studies. Farmers buy about 95 percent of the wheel tractors that are manufactured. They buy a much smaller percentage of the domestic supply of crawler and garden-type tractors.

1/ The material of this report was supplied largely by the voluntary crop reporters of the U. S. Department of Agriculture. On February 1948 by means of a mailed questionnaire, they reported for each tractor on their farms, the year of manufacture, the make, the model, as well as the time used, the quantity of motor fuel and motor oil consumed in 1947, and the size of the farms. Most of the material of the February 1948 study concerning fuel consumption, annual use, and size and type of tractor was published in the processed report issued by the Bureau of Agricultural Economics F. M. 72, "Fuel and Motor Oil Consumption and Annual Use of Farm Tractors". The crop reporters' replies were used to develop the estimates of this report on the number of wheel tractors remaining on farms January 1, 1948 by year of manufacture; the estimates by the Bureau of the annual purchase of tractors by farmers were the principal source of estimates of annual purchases of tractors.

Wheel tractors, as used in this report, refer to factory-made three- and four-wheel riding tractors of six and more draw-bar horsepower. The horsepower ratings are from Nebraska tests (Test H), when available. For tractors not tested at Nebraska, manufacturers' ratings were used. The manufacturers' ratings for tractors made before 1928, and tested at Nebraska, were usually in close agreement with the Nebraska rated load tests.

Conditions in recent years have brought an increase in the average life of tractors. In the last two decades there have been many improvements in both design and performance of tractors but the changes were less than were the changes in the decade preceding 1930. Thus, obsolescence has not influenced tractor life as much as before. During the war and in the immediate postwar period the number of tractors was not adequate to meet the tremendous demand. Many farmers who wanted to buy were compelled to defer their purchases, or buy used tractors, or repair their old ones. In fact, many of the used tractors that were in dealers' hands on January 1, 1942 would ordinarily have been junked but were reconditioned and sold for farm use. The shortage of tractors in relation to the demand has kept many old tractors in use and thus has contributed decidedly to the increase in the life of tractors during recent years.

An average life of 19 to 20 years is indicated for wheel tractors bought before 1948. This is about 50 percent higher than the average life estimated for the tractors that were on farms January 1, 1941. ^{2/} Of the tractors 10 years of age on January 1, 1948 (made in 1938) it is estimated that about 96 percent were still on farms, as were more than 85 percent of the 15-year-old tractors. The great bulk of tractors disappeared from farms, from 16 to 22 years after the year of purchase. Only about one-fifth remained after 21 years had passed (table 1). Of the tractors made in 1920, about 4 percent were estimated to be on farms on January 1, 1948.

USE OF OLD TRACTORS

The demand for used machines by operators of small farms who have relatively little work to do with them contributes markedly to the life of all types of farm machines.

As these small operators have less work than do operators of larger farms, the loss of time due to repairing machines is not crucial. But the principal reason operators of small farms often buy used machines is because of the low costs of the use of old machines. At the end of 5 years of use with normal market conditions machines usually have a market value not to exceed 50 percent of their original cost. ^{3/} After a machine is 10 years old the annual depreciation costs are very small, since the market value of machines then is not very different from the "trade in" value when the machine is to be discarded, so farmers with small annual use can often obtain a low cost with used machines. Some operators of medium and large farms can also use relatively old tractors and other machines to advantage. Many of these farmers have sold their last teams, and now find that they need additional power to speed up work during the rush season and on jobs that can be done to advantage with more than one power unit.

^{2/} U. S. Bureau of Agricultural Economics processed report F. M. 30, "Farm Tractors, Type, Size, Age, and Life, February 1942."

^{3/} Cornell University, Agricultural Experiment Station Bulletin 751, "Costs of Farm Power and Equipment," by J. P. Hertel and Paul Williamson.

Table 1.- Wheel tractors: Estimated annual purchases of new tractors and percentage on farms, January 1, 1948 and discarded, 1947, by year of make, 1917-47 1/

Year of make	Estimated annual purchases of new tractors	Percentage of purchases	
		Remaining on farms Jan. 1, 1948	Disappeared during 1947
	Thousand	Percent	Percent
1947	333	99.9	.1
1946	193	99.7	.2
1945	177	99.4	.3
1944	198	99.1	.3
1943	76	98.7	.4
1942	160	98.2	.5
1941	276	97.7	.5
1940	206	97.2	.5
1939	148	96.6	.6
1938	136	96.0	.6
1937	205	95.0	1.0
1936	151	93.5	1.5
1935	113	92.0	1.5
1934	60	90.0	2.0
1933	22	87.0	3.0
1932	22	83.0	4.0
1931	54	78.0	5.0
1930	108	70.0	8.0
1929	130	60.0	10.0
1928	76	44.0	16.0
1927	128	29.0	15.0
1926	111	19.0	10.0
1925	108	14.0	5.0
1924	88	10.0	4.0
1923	105	8.0	2.0
1922	92	6.0	2.0
1921	64	5.0	1.0
1920	136	4.5	.5
1919	106	4.0	.5
1918	82	3.2	.8
1917	39	2.5	.7

1/ Wheel tractors include all factory-made three- and four-wheel riding tractors of six and more draw-bar horsepower. Purchases from 1920 to 1930, and 1935-1947 are based on Facts for Industry reports of the Bureau of the Census, and on imports and exports of wheel tractors as reported by the Department of Commerce. Facts for Industry reports were not available from 1931 to 1934 and purchases in these years are based on information from tractor manufacturers. Around 95 percent of the domestic supply of wheel tractors was estimated to have been bought by farmers in most years.

Of the January 1, 1948 wheel tractors on farms of less than 50 acres, more than 8 percent were more than 20 years old. About 2 percent of those on farms of 500 acres, and more, were of this age group (table 2).

Table 2.- Wheel tractors: Total number and percentage over 20 years old, by size of farm, January 1, 1948

	:	<u>Wheel tractors</u>		:	Percentage of farms with
Size of farm	:		: Percentage	:	wheel tractors over 20
	:	All ages	: over 20	:	years of age that had
	:	1/	: years old	:	other tractors
	:			:	
	:	<u>Thousands</u>	<u>Percent</u>	:	<u>Percent</u>
Under 50	:	220	8.6	:	6
50 - 99.9	:	360	4.9	:	30
100 - 179.9	:	760	4.1	:	40
180 - 259.9	:	448	2.5	:	46
260 - 499.9	:	547	2.8	:	56
500 and over	:	415	2.0	:	68

1/ The above distribution figures were developed by applying the percentage figures of factory-made wheel tractors and home-made tractors by size of farm as shown by the 1945 census to the January 1, 1948 estimate of number of factory-made wheel types. The home-made tractors amounted to only 3 percent of the 1945 total of wheel and home-made tractors.

The relatively high proportion of old tractors on small farms probably reflects a longer average life on them, as well as a tendency for operators of these farms to buy used machines. The life of a machine measured in years is influenced by annual use of the machine, which on small farms is much below average.

Of the small farms reporting old tractors, only 6 percent had other tractors, while almost 70 of the operators of farms of 500 and more acres had one or more additional tractors.

Annual use of tractors, as is the case with all types of farm machines, tends to decrease as the age of the machine increases. Thus, in 1947, wheel tractors 10 years old and less were used an average of 676 hours; tractors 11 to 20 years, 570 hours; and tractors over 20 years old, 270 hours. Of the tractors over 20 years old; those from 21 to 23 years were used 325 hours each; the 24- to 28-year-old tractors 200 hours; and tractors 29 years old and older were used an average of 160 hours, in 1947. Average annual hours of use of old tractors in that year was below average on the small farms. There were no significant differences in hours of use on farms in other size groups (table 3).

About 6 percent of the old tractors were not used in 1947, and more than half of them were used 150 hours or less. Some of the owners of old tractors evidently keep them repaired and get a lot of use from them in a year. Almost one-eighth of the old wheel tractors were used more than 500 hours each; and more than one-fourth of these were used more than 300 hours in 1947.

Table 3.- Work performed on U. S. farms with wheel tractors over 20 years old, by size of farm, 1947

				Percentage of tractors					
				Used					
Size of farm	Average	Average	Not	75 hours	76-150	151-300	301-500	Over	
	size of	time	used	& less	hours	hours	hours	500	
	tractor	used							
Acres	Draw-bar	H.P.	Hours	Percent	Percent	Percent	Percent	Percent	Percent
Under 50	10.7	190	6	34	16	28	10	6	
50 - 99.9	12.1	255	4	32	20	20	10	14	
100 - 179.9	12.6	245	5	24	22	26	14	9	
180 - 259.9	13.8	295	9	34	13	17	12	15	
260 - 499.9	15.4	315	5	25	18	19	19	14	
500 and over	15.7	280	9	31	13	17	20	10	
All farms	13.3	270	6	28	18	21	15	12	

Although new tractors are now readily available in the market, there are indications that the average life of the tractors of current makes will be even longer than the average life of the tractors bought before January 1, 1948. Demand for old tractors by operators of small farms, and as additional tractors on the larger farms, may result in a price for used tractors in excess of their salvage value.

Further improvement in design and performance of tractors can be expected, but it seems probable that obsolescence will continue to diminish as a factor influencing the life of tractors. The great bulk of the wheel tractors now on farms have rubber tires and are adapted to work row crops. Tires reduce vibration and may contribute to longer life for the tractor. During the last two decades, the discard of wheel tractors not adapted for row crop work has been greater than was the case for general-purpose tractors of the same age.

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